

WHAT IS CLAIMED IS:

1. A demodulator for use in a communications channel, comprising:
 - a channel estimator section configured to receive a modulated signal over said communications channel and generate reference symbols based on said modulated signal;
 - a fuzzy adaptive filter (FAF) parameter determination section coupled to said channel estimator section and configured to receive said modulated signal and said reference symbols and generate signal samples based on said modulated signal and said reference symbols; and
 - a detector section coupled to said FAF parameter determination section and configured to receive said signal samples and generate a soft decision signal and a hard decision signal based on said signal samples.
2. The demodulator of claim 1, further comprising:
 - a mapping section coupled to said detector section and configured to receive said hard decision signal and generate a mapping signal based on said hard decision signal;
 - a modulation removal section coupled to said mapping section and configured to receive said mapping signal and said modulated signal and generate a modulation removal signal based on said mapping signal and said modulated signal;
 - a phase estimation section coupled between said FAF parameter determination section and said modulation removal section and configured to receive said modulation removal signal and generate a phase estimation signal based on said modulation removal signal, wherein said FAF parameter determination section is configured to generate said signal samples based on said modulated signal, said reference symbols and said phase estimation signal.
3. The demodulator of claim 1, further comprising:
 - a matched filter section coupled between said communications channel and said channel estimator section and said FAF parameter determination section; and
 - a buffer section coupled between said matched filter section and said modulation removal section.
4. The demodulator of claim 1, wherein said communications channel comprises a satellite communications channel.
5. The demodulator of claim 4, wherein said satellite communications channel comprises a satellite downlink communications channel.
6. The demodulator of claim 1, wherein said modulated signal comprises a

Quadrature Phase Shift Keying (QPSK) modulated signal and said detector section comprises a QPSK detector.

7. The demodulator of claim 2, wherein said modulated signal comprises a quadrature phase shift keying (QPSK) modulated signal and said mapping section comprises a QPSK mapper.

8. The demodulator of claim 1, wherein said phase estimation section comprises a block phase estimator (BPE).

9. The demodulator of claim 1, wherein said communications channel comprises one of a satellite communications channel, digital video broadcasting (DVB) communications channel, a terrestrial broadcast communications channel, a cellular communications channel and a quadrature phase shift keying (QPSK) communications channel.

10. The demodulator of claim 1, wherein said demodulator is included in a device comprising one of a repeater, a personal digital assistant (PDA), a personal computer, a television, an Internet appliance, a cellular phone and a set-top box.

11. The demodulator of claim 1, wherein said device comprises a Bluetooth-enabled device.

12. A demodulation method for use in a communications channel, comprising:
receiving a modulated signal over said communications channel and generating reference symbols based on said modulated signal via a channel estimator section;
receiving said modulated signal and said reference symbols and generating signal samples based on said modulated signal and said reference symbols via a fuzzy adaptive filter (FAF) parameter determination section coupled to said channel estimator section; and
receiving said signal samples and generating a soft decision signal and a hard decision signal based on said signal samples via a detector section coupled to said FAF parameter determination section.

13. The demodulation method of claim 12, further comprising:
receiving said hard decision signal and generating a mapping signal based on said hard decision signal via a mapping section coupled to said detector section;
receiving said mapping signal and said modulated signal and generating a modulation removal signal based on said mapping signal and said modulated signal via a modulation removal section coupled to said mapping section;
receiving said modulation removal signal and generating a phase estimation signal

based on said modulation removal signal via a phase estimation section coupled between said FAF parameter determination section and said modulation removal section; and

generating said signal samples based on said modulated signal, said reference symbols and said phase estimation signal via said FAF parameter determination section.

14. The demodulation method of claim 12, further comprising:

coupling a matched filter section between said communications channel and said channel estimator section and said FAF parameter determination section; and

coupling a buffer section between said matched filter section and said modulation removal section.

15. The demodulation method of claim 12, further comprising configuring said communications channel as a satellite communications channel.

16. The demodulation method of claim 15, further comprising configuring said satellite communications channel as a satellite downlink communications channel.

17. The demodulation method of claim 12, further comprising configuring said modulated signal as a Quadrature Phase Shift Keying (QPSK) modulated signal and said detector section as a QPSK detector.

18. The demodulation method of claim 13, further comprising configuring said modulated signal as a quadrature phase shift keying (QPSK) modulated signal and said mapping section as a QPSK mapper.

19. The demodulation method of claim 12, further comprising configuring said phase estimation section as a block phase estimator (BPE).

20. The demodulation method of claim 12, further comprising configuring said communications channel as one of a satellite communications channel, digital video broadcasting (DVB) communications channel, a terrestrial broadcast communications channel, a cellular communications channel and a quadrature phase shift keying (QPSK) communications channel.

21. The demodulation method of claim 12, further comprising configuring said demodulator to be included in a device comprising one of a repeater, a personal digital assistant (PDA), a personal computer, a television, an Internet appliance, a cellular phone and a set-top box.

22. The demodulation method of claim 12, further comprising configuring said device as a Bluetooth-enabled device.

23. A computer-readable medium carrying one or more sequences of one or more instructions for a demodulation method, the one or more sequences of one or more instructions including instructions which, when executed by one or more processors, cause the one or more processors to perform the steps recited in any one of claims 12-22.

24. A demodulator apparatus for use in a communications channel, comprising:
a channel estimation means for receiving a modulated signal over said communications channel and generating reference symbols based on said modulated signal;
a fuzzy adaptive filter (FAF) parameter determination means coupled to said channel estimation means for receiving said modulated signal and said reference symbols and generating signal samples based on said modulated signal and said reference symbols; and
a detection means coupled to said FAF parameter determination means for receiving said signal samples and generating a soft decision signal and a hard decision signal based on said signal samples.